Amendments to the Claims

The following Listing of Claims replaces all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (currently amended): A method of processing an input image compressed in accordance with a block discrete cosine transform (DCT) image compression process, comprising:

computing spatially-shifted forward transforms of the input image, each of the forward transforms being computed based on a denoiser transform Z having an associated transpose Z', wherein a matrix multiplication between Z and Z' produces a diagonal matrix Λ, Z=F(D), F specifies a nonlinear mapping from coefficients of D to coefficients of Z, and D substantially corresponds to a frequency-domain transform;

denoising the forward transforms based on nonlinear mappings derived from quantization values linked to the input image;

computing spatially-shifted inverse transforms of the denoised forward transforms, each of the inverse transforms being computed based on Z and Z'; and

computing an output image based on a combination of ones of the spatially-shifted inverse transforms.

Claim 2 (original): The method of claim 1, wherein D is a block-based linear transform.

Claim 3 (previously presented): The method of claim 2, wherein the computing of the spatially-shifted forward transforms comprises applying a forward transform operation to each of multiple positions of a blocking grid relative to the input image and the spatially-shifted inverse transforms are computed based on the relative positions of the blocking grid used to compute corresponding ones of the spatially-shifted forward transforms.

Claim 4 (original): The method of claim 2, wherein D is a discrete cosine transform.

Claim 5 (original): The method of claim 3, wherein D is a one-dimensional discrete cosine transform.

Claim 6 (original): The method of claim 5, wherein F is an arithmetic operator.

Claim 7 (original): The method of claim 6, wherein F is a rounding arithmetic operator.

Claim 8 (original): The method of claim 1, wherein F is a mapping from coefficients of D to corresponding coefficients of Z having values selected from 0 and ±2N where N has an integer value.

Claim 9 (previously presented): The method of claim 1, wherein F is a mathematical operator corresponding to one of a rounding operator, a floor operator, a ceiling operator, and a truncate operator, and the computing of the forward transform coefficients comprises applying the mathematical operator to coefficients of D weighted by respective scaling factors to obtain corresponding coefficients of Z.

Claim 10 (previously presented): The method of claim 9, wherein the computing of the forward transform coefficients comprises weighting the coefficient of D by a common scaling factor.

Claim 11 (original): The method of claim 10, wherein F corresponds to a rounding operator applied to the weighted coefficients of D.

Claim 12 (previously presented): A method of processing an input image, comprising:

computing spatially-shifted forward transforms of the input image, each of the forward transforms being computed based on a denoiser transform Z having an associated transpose Z', wherein a matrix multiplication between Z and Z' produces a diagonal matrix Λ, Z=F(D), F specifies a mapping from coefficients of D weighted by a common scaling factor to

corresponding coefficients of Z, and D substantially corresponds to a frequency-domain transform;

denoising the forward transforms based on nonlinear mappings derived from quantization values linked to the input image, wherein the nonlinear mappings are derived from quantization values weighted by the common scaling factor;

computing spatially-shifted inverse transforms of the denoised forward transforms, each of the inverse transforms being computed based on Z and Z'; and

computing an output image based on a combination of ones of the spatially-shifted inverse transforms.

Claim 13 (previously presented): The method of claim 9, wherein the denoising comprises applying to the forward transforms nonlinear mappings derived from the quantization values linked to the input image and weighted by respective scaling factors.

Claim 14 (previously presented): The method of claim 1, wherein the computing of the forward transforms is based on a factorization of Z.

Claim 15 (original): The method of claim 1, wherein the input image corresponds to a decompressed version of an input image compressed based on a given quantization process and the forward transforms are denoised based on the given quantization process.

Claim 16 (previously presented): The method of claim 1, wherein the forward transforms are denoised by setting to zero each of the forward transform coefficients with an absolute value below a respective threshold derived from a respective one of the quantization values linked to the input image and leaving unchanged each of the forward transform coefficients with an absolute equal to at least a respective threshold derived from a respective ones of the quantization values linked to the input image.

Claim 17 (original): The method of claim 16, further comprising sharpening the forward transform coefficients by increasing nonlinear transform parameters by respective factors that are

larger for higher spatial frequency forward transform coefficients than for lower spatial frequency forward transform coefficients.

Claim 18 (original): The method of claim 1, wherein the output image is computed from a weighted combination of the inverse transforms.

Claim 19 (original): The method of claim 18, wherein the computed output image corresponds to an average of the inverse transforms.

Claim 20 (currently amended): A method of processing an input image, comprising:

computing spatially-shifted forward transforms of the input image, each of the forward transforms being computed based on a denoiser transform Z having an associated transpose Z', wherein a matrix multiplication between Z and Z' produces a diagonal matrix Λ, $Z=F(D)$, F specifies a nonlinear mapping from coefficients of D to coefficients of Z, and D substantially corresponds to a frequency-domain transform;

denoising the forward transforms based on nonlinear mappings derived from quantization values linked to the input image;

computing spatially-shifted inverse transforms of the denoised forward transforms, each of the inverse transforms being computed based on Z and Z'; and

computing an output image based on a combination of ones of the spatially-shifted inverse transforms~~The method of claim 1~~, wherein computing the output image comprises computing a base image from a combination of ones of the inverse transforms, computing a ringing correction image based at least in part on computed measures of local spatial intensity variability for pixels of each of the inverse transforms, and combining pixel values from the base image and the ringing correction image.

Claim 21 (original): The method of claim 20, wherein the base image has pixel values corresponding to respective averages of values of corresponding pixels in the inverse transforms.

Claim 22 (canceled)

Claim 23 (currently amended): The method of claim ~~22~~20, further comprising assigning to each pixel in the ringing correction image a value of a corresponding ~~intermediate image~~inverse transform pixel having a lowest computed measure of local spatial intensity variability of the corresponding inverse transform~~intermediate image~~ pixels.

Claim 24 (currently amended): The method of claim ~~22~~20, further comprising assigning to each pixel in the ringing correction image a value corresponding to an average of multiple corresponding inverse transform~~intermediate image~~ pixels in a lowest percentile of local spatial variability measures of the corresponding inverse transform~~intermediate image~~ pixels.

Claim 25 (canceled)

Claim 26 (currently amended): The method of claim ~~25~~20, wherein the output image is computed by a weighted combination of the base image and the ringing correction image.

Claim 27 (currently amended): The method of claim ~~22~~20, wherein in the combining the base image ~~contribution~~contributes less to the output image ~~is less~~ than the ringing correction image ~~contribution~~ for pixels adjacent to transition regions in the base image.

Claim 28 (currently amended): A system for processing an input image compressed in accordance with a block discrete cosine transform (DCT) image compression process, comprising:

a forward transform module configured to compute spatially-shifted forward transforms of the input image, each of the forward transforms being computed based on a denoiser transform Z having an associated transpose Z', wherein a matrix multiplication between Z and Z' produces a diagonal matrix Λ, Z=F(D), F specifies a nonlinear mapping from coefficients of D to coefficients of Z, and D substantially corresponds to a frequency-domain transform;

a nonlinear denoiser module configured to denoise the forward transforms based on nonlinear mappings derived from quantization values linked to the input image;

an inverse transform module configured to compute spatially-shifted inverse transforms of the denoised forward transforms based on Z and Z'; and

an output image generator module configured to compute an output image based on a combination of ones of the spatially-shifted inverse transforms.

Claim 29 (canceled)

Claim 30 (currently amended): A ~~machine~~computer-readable medium storing ~~machine~~computer-readable instructions for processing an image compressed in accordance with a block discrete cosine transform (DCT) image compression process, the computer-readable instructions being executable to cause ~~causing~~ a ~~machine~~computer to perform operations comprising:

computing spatially-shifted forward transforms of the input image, each of the forward transforms being computed based on a denoiser transform Z having an associated transpose Z', wherein a matrix multiplication between Z and Z' produces a diagonal matrix Λ, Z=F(D), F specifies a nonlinear mapping from coefficients of D to coefficients of Z, and D substantially corresponds to a frequency-domain transform;

denoising the forward transforms based on nonlinear mappings derived from quantization values linked to the input image;

computing spatially-shifted inverse transforms of the denoised forward transforms based on Z and Z'; and

computing an output image based on a combination of ones of the spatially-shifted inverse transforms.

Claim 31 (currently amended): The method of claim 1, wherein $Z_{ij} = \text{round}\{(3.5)\cdot D_{ij}\}$, round{} is ~~the~~ a rounding operator, Z_{ij} is ~~the~~ a coefficient of Z in row i and column j, and D_{ij} is the coefficient of a discrete cosine transform in row i and column j.